about one point out of fourteen for admission. My present data, derived from official sources, here follow, but they are, for sundry reasons, incomplete. I wish to request that any reader of this note who is connected with a university, college or technical school, will make sure whether his institution is correctly represented in the lists below, and if not I shall be very grateful if he will communicate to me the suitable correction. I shall later publish a supplementary list, and finally a complete one in connection with other related data.

The following institutions accept the College Entrance Examination Board's examinations in botany, and state the fact in their official publications: Bryn Mawr, California, Cincinnati, Columbia, Cornell, Dartmouth, Harvard (although it can count for only a half year), Illinois, Leland Stanford, Maine, Massachusetts Institute of Technology, Massachusetts Agricultural College, Mount Holyoke, Nebraska, Northwestern, Ohio, Pennsylvania, Rochester, Simmons, Smith, Syracuse, Washington (St. Louis), Wellesley, Wells, Vermont, Woman's College of Baltimore, Yale Scientific School.

The following institutions, I am assured, accept the board's examinations, although at last accounts no mention of the fact had been made in their official publications: Chicago, Haverford, Kansas, Minnesota, Missouri, North Carolina, Oberlin, Wabash, Williams.

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## SCIENTIFIC JOURNALS AND ARTICLES

THE contents of the March issue of the *Journal of Terrestrial Magnetism and Atmospheric Electrictiy* are as follows: "Scientific Staff and Crew of the *Carnegie* at Falmouth, England, October, 1909" (Frontispiece); "Completion of the First Cruise of the *Carnegie*"; "The Present State of Our Knowledge of Magnetic Materials," A. A. Knowlton; "Beginning and Propagation of the Magnetic Disturbance of May 8, 1902, and of Some Other Magnetic Storms," L. A. Bauer; "Analysis of the Magnetic Disturbance of January 26, 1903, and General Considerations Regarding Magnetic Changes," L. A. Bauer; "The Magnetic Storm of September 25, 1909, at de Bilt, near Utrecht, Holland," G. van Dyk; "Discontinuance of the Baldwin Magnetic Observatory and Establishment of the Tucson Magnetic Observatory," R. L. Faris; "Principal Magnetic Storms Recorded at the Cheltenham Magnetic Observatory, October–December, 1909," O. H. Tittmann; "Aurora Borealis observed at Beinn Bhreagh, near Baddeck, Nova Scotia, September 21 and October 18, 1909," A. G. Bell; "Magnetic and Allied Observations in connection with Halley's Comet"; "Hellmann's Bibliography of Magnetic Charts," L. A. B.; "Galitzin, Arnold, The Beginning of an Earthquake Disturbance," H. F. Reid; "The Tenth Edition of Müller-Poullet's Physics (Vol. IV., Pt. 1)," W. G. Cady.

## SCIENTIFIC BOOKS

*Radiation, Light and Illumination.* A Series of Engineering Lectures Delivered at Union College. By CHARLES PROTEUS STEINMETZ, A.M., Ph.D. Compiled and edited by JOSEPH LE ROY HAYDEN. Pp. xii + 305. New York, McGraw-Hill Book Company. 1909.

This latest book from the pen of Dr. Steinmetz constitutes to some extent a departure from his previous writings. In it an attempt, perhaps the first definite attempt, has been made to bring together not only the principal physical facts, but also many of the more important physiological facts which pertain to the effects of luminous and attendant radiation. The view-point throughout is that of the engineer. The book is the outcome of a series of lectures to engineering students. It is intended in the author's words in the preface "not merely as a text-book of illuminating engineering, nor as a text-book on the physics of light and radiation, but rather as an exposition, to some extent, from the engineering point of view, of that knowledge of light and radiation which every educated man should possess, the engineer as well as the physician or the user of light."

With the exception of a few chapters there

is no mathematics, and throughout there is evidence of a desire to make the book attractive to the non-technical reader. It is somewhat doubtful, however, whether the book will appeal to many except students or technical men who desire a brief but comprehensive survey of certain phases of illuminating engineering. As a whole the book is suggestive, and should be of distinct value in helping to correlate the various phenomena of physics and physiology on which the scientific side of illuminating engineering rests.

It would scarcely seem, however, that a text-book for students, or an exposition for the general educated public, should be the proper place to introduce new ideas and terms which have not yet been accorded general acceptance by scientific writers, and yet the present book contains many such innovations. Wave-lengths are expressed in micro-centimeters (cm. $\times 10^{-6}$) on the ground that there are several other systems in use, none of which is scientifically accurate (p. 7) according to the C.G.S. system; and yet several pages further on (p. 16) a sudden jump is made from centimeters to feet. The classification (p. 20) of "the total range of known radiations" into "the *electric* waves and the *light* waves" would scarcely seem orthodox or clarifying, particularly as the "light" waves are made to include even X-rays.

In Lecture IX. a number of types of photometers, some of them quite primitive, are described, and several pages are given to a description of a so-called "luminometer" which employs the old but sometimes very useful method of "reading distances," whereas no mention has been found of one of the most common, and perhaps the most accurate photometer in use at the present day for comparing lights of approximately the same color—the Lummer-Brodhun photometer in its two forms. Even the very familiar Bunsen photometer, though mentioned by *name*, is nowhere described. The photometer shown in the diagrammatic sketch and described under the name "Bunsen" on page 170 is in reality a simple Ritchie wedge, distinctly different from the "grease spot" photometer invented by Bunsen, or even the more recently improved Leeson disk which is sometimes substituted for it. Again (p. 260) it would seem that too little weight is given to the accepted definition of "illumination" compared with the author's idea of what this term should indicate.

Lecture III., Physiological Effects of Radiation, would seem to the reviewer to be very unfortunate in its manner of presentation. As the present knowledge in this field, particularly in regard to the "pathological and other effects on the eye," is quite restricted, and only to a very limited extent satisfactorily established, one is likely to wonder whether the many positive statements are correct expressions of accepted facts or merely speculation. Here, particularly, a few references to authoritative sources of information would be appreciated. It is perhaps questionable whether the various harmful effects of light on the eye can be so readily classified into the two distinct groups, "power effects" and "specific effects of the shorter waves." It is quite probable that a definite large amount of radiant energy incident on the eye would be capable of producing entirely different results if all of the energy were in the infra-red, or if all were concentrated in the most luminous portion of the visible spectrum. We can look at an incandescent mantle or an incandescent filament for a brief period without any pronounced feeling of pain, but what would the result be if all of the radiant energy from these sources could be transformed into light, even of the longer wave-lengths where the so-called "specific effects" presumably do not enter? The dazzling glare in such an experiment, were it practicable, would very probably be distinctly painful. In general it is necessary to consider the quality in conjunction with the quantity, so that the classification suggested would scarcely seem justified. Moreover, it would seem wise to discriminate between those effects which pertain to the anterior portions of the eye as in the absorption of large quantities of ultra-violet radiation, and those harmful effects which are retinal.

Lecture V., Temperature Radiation, gives a very brief résumé (with a new notation) of the laws of temperature radiation. In the generality of the statements, however, accuracy is ofttimes overlooked. It is not true that (p. 74) "Practically all bodies give the same temperature radiation, *i. e.*, follow the temperature law (1)" (which states that the total emissivity is proportional to the *fourth* power of the absolute temperature). For most substances investigated the exponent should be greater than "4," in some cases (see recent investigation by Coblentz, Bureau of Standards Bulletin, Vol. 5, p. 339) as large as 6 or even 7. Little attention is given to the effect of selectivity (though slight mention is made of it) in determining the high efficiencies of some sources, such, for example, as the osmium lamp. It is at least questionable whether (p. 80) the melting point of osmium is higher than that of tantalum merely because it can be operated at a higher efficiency. Osmium undoubtedly is distinctly selective.

On the whole, although the book is extremely interesting to the technical reader and is quite suggestive, there would appear to be a lack of care in gathering together the facts, and a somewhat too dogmatic style in presenting those topics which are still more or less in the domain of speculation. The color pyrometer described on pp. 89–90 is apparently a real instrument, but any attempt to reproduce it would soon convince one that no mixture of spectrum yellow and spectrum blue would give a green that could be matched in hue with spectrum green. Numerous small errors, both typographical and factual, could be cited, but would scarcely strengthen the conclusion that an early revision of the book would be most welcome.

The reviewer desires, however, to express his appreciation of the service which this book has rendered in coordinating the closely related phenomena of physics and physiology in their relation to illumination, and in calling attention to many vital questions of illumination which are frequently given too little attention in practise (such as those of directed and diffused illumination, shadows, the effects of sources of high intrinsic brightness in the field of view, etc.).

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*Die Säugetierontogenese in ihrer Bedeutung für die Phylogenie der Wirbeltiere.* Von A. A. W. Hubrecht. Jena, Gustav Fischer. 1909. Pp. 247, 186 text figures.

Most zoologists know that Professor Hubrecht has been an assiduous student of mammalian embryology for many years. The reviewer well remembers the beautiful preparations—probably of *Tupaja*—exhibited by the author at the Oxford meeting of the British Association in 1895.

The appearance of a volume on the subject from such experienced hands may be supposed to be an occurrence of no little interest to students and teachers in this province of biology. Whether the volume that actually comes to us fulfills expectations depends largely on what the particular user may feel in need of, and what his standpoint may be with reference to the more general problems involved.

If one be chiefly desirous of a manual that should set forth the main facts of mammalian development positively ascertained up to the present moment, along with such generalizations as a conservative zoologist might recognize as truly illuminating and not objectionably forced, the book can not be very satisfactory, so it would seem.

If, on the other hand, one would wish to see how strong a case a competent specialist can make of a fundamental theory of his own, then the work may be adjudged satisfactory. What we have essentially is a case of special pleading, as indeed the title permits if it does not intend us to infer. Not mammalian ontogeny, but such ontogeny in its significance for vertebrate phylogeny, is the aim.

This statement is not intended to give the impression that the reader longing for facts primarily will find nothing to his purpose. Not only the text but the many figures present very many facts. Such a summary, for ex-